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The Recruit Assessment Program (RAP) Experience With Adverse Childhood Experiences (ACE) Questions

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ABSTRACT

The Recruit Assessment Program (RAP) study was begun in June 2001 to assess the feasibility of collecting computerized comprehensive baseline health information from new recruits, including data on demographics, medical history, psychosocial history, substance abuse, and family history. Past evaluations of from the Adverse Childhood Experiences (ACE) study have found a relationship between such experiences and adverse adult health outcomes, including substance abuse, attempted suicide, and depression. Thus, the ACE questions were added to the RAP questionnaire in June 2002. Focus group experiences with ACE questions on the RAP instrument, completed by Marine Corps recruits in San Diego and Army recruits in Fort Jackson, revealed no specific concerns. In extensive post-focus group implementation of RAP (>100,000 questionnaires completed overall), ACE questions also appeared well accepted and completed without problems. Reliability metrics, overall, indicate that ACE questions were likely assessing what they were intended to assess among RAP respondents. Reasonably strong concordance was noted for internal reliability within the instrument. Test–retest results were robust, especially when the instrument was completed with only a short time interval between testing. Results from these, and other analyses, will be helpful to DoD policymakers considering the value of ACE questions in future military questionnaires.

INTRODUCTION

As highlighted by the Persian Gulf War of 1990–1991, there is a need to obtain accurate baseline health data from all military service members. The Recruit Assessment Program (RAP) study was begun in June 2001 to assess the feasibility of collecting computerized comprehensive baseline health information from new recruits, including data on demographics, medical history, psychosocial history, substance abuse, and family history.^{1,2}

The RAP questionnaire was developed by public health officials, clinicians, and researchers from the Department of Defense (DoD), Veterans Health Administration, and Department of Health and Human Services. Questions were derived from standardized survey instruments, including the Alcohol Use Disorders Identification Test,^{3,4} the National Comorbidity Study,^{5,6} the Adverse Childhood Experiences (ACE) Study,⁷⁻¹¹ the Childhood Trauma Questionnaire,^{12,13} and the Conflict Tactics Scales.¹⁴ Past evaluations of ACE have found a relationship between such experiences and adverse adult health outcomes, including substance abuse, attempted suicide, and depression.⁷⁻¹¹ Thus, the ACE questions were added to the RAP questionnaire in June 2002, when the second version of the RAP questionnaire was introduced. A third version of the questionnaire was introduced in October 2002, which was different from prior versions primarily in the language of the informed consent and notice of privacy practices. A fourth version of the RAP questionnaire was implemented in March 2003, and is currently in use among Marine recruits in San Diego. It differs from previous versions in that it asks additional education questions, such as history of homeschooling, school suspension, learning disabilities, and family socioeconomic status (see Appendix A).

FOCUS GROUP TESTING

Focus group tests were conducted between 2000 and 2002 among Marine Corps recruits at Marine Corps Recruit Depot, San Diego, CA, and between 2002 and 2004 among Army recruits at U.S. Army Training Center, Fort Jackson, SC. The initial RAP survey was tested by 198 male recruits in small focus groups of 10 to 20 recruits. Recruits were given the opportunity to comment on difficulties encountered answering individual questions, as well as to discuss the length and acceptability of the overall questionnaire. The original questionnaire required 60 minutes to complete and was 17 pages in length. Recruit feedback from the focus groups was used to shorten the length of the questionnaire, so that the current version takes about 30 minutes to complete and is 12 pages in length. Questions were simplified, and revised questions improved readability and comprehension, especially on family history issues. Since a large number of recruits reported not coming from two-parent homes, questions were clarified to refer to either “biological father” or “the father who raised you” and “biological mother” or “the mother who raised you.”

In all focus group testing, no specific concerns were voiced regarding the ACE questions. It should be noted that Marine Corps training in San Diego includes only male recruits, while Army training in Fort Jackson includes both men and women. It is not clear whether opinions of focus groups from these two populations can be generalized to all military recruits. There may also be concern that, although recruits were forthcoming about many questionnaire concerns, they may not have been candid about ACE concerns in focus group settings.

POST-FOCUS GROUP EXPERIENCES

Nearly 80,000 RAP surveys were collected from Marines in San Diego between June 2001 and January 2006, representing 99% of recruits entering training at this site. Again, throughout this period, no specific concerns have been voiced regarding the ACE questions.

Question-by-question completion rates have been monitored for the RAP questionnaire (Figure 1), allowing examination of questions that are commonly skipped or missed. In San Diego, the 10 most frequently skipped/missed questions on the RAP instrument range from 6.6% to 8.5% missing (Table 1), with the most commonly skipped question being at the end of the questionnaire: “During the year prior to entering the military, [were you] limited in any kind of work or other daily activities as a result of your physical health?” This question originates from a standard instrument, the SF-36 health survey¹⁵ and presumably is slightly more difficult to interpret for some recruits. Note the slight drop in completion rates near the end of the questionnaire, as seen in Figure 1, likely representing a fatigue factor or lack of time to complete.

The ACE questions appear on pages 10 and 11 of the current 12-page instrument, and they are not among the top 10 frequently skipped/missed questions. Completion rates in San Diego range from 96.1% for the question, “How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at you?,” to 95.3% for the question, “How often did a parent or adult living in your home swear at you, insult you, or put you down?” (see Table 2). The completion rate figure (Figure 1) also illustrates that the questions preceding the ACE questions—which ask personal history about traffic tickets, seat belt use, age of first intercourse, condom use, and sexually transmitted disease history—all have lower completion rates than the ACE questions. This would imply that the ACE questions were not as difficult to complete for most recruits as the preceding questions.

At Fort Jackson, 35,492 Army trainees completed the RAP questionnaire between October 2002 and May 2004. This represents 74% of the trainee population over that time period. Approximately 40% of Fort Jackson RAP respondents were women. Question-by-question completion rates from Fort Jackson (October 2002 through September 2003) show a trend for increasing nonresponse rates (men and women) throughout the final section of the survey, suggesting that recruits had insufficient time to complete the survey or were fatigued (Figure 2).¹⁶ The ACE questions are in this final section, but did not have the highest nonresponse rates in the section. In the first sections of the survey, the Fort Jackson findings show that questions regarding occupational exposures, number of alcohol drinks consumed in a typical day of drinking, and whether the recruit was right- or left-handed had higher rates of nonresponse than other questions on the questionnaire, similar to findings among Marines in San Diego. The most commonly skipped questions at Fort Jackson, with 13.3% missing, were again located at the end of the questionnaire: “During the year prior to entering the military, [were you] limited in any kind of work or other daily activities as a result of your physical health?” and “During the year prior to entering the military [did you not] do work or other activities as carefully as usual as a result of your emotional health?”

In addition to completion rate analysis, the RAP team at Fort Jackson provided unique insight into the questionnaire’s acceptability through a separate mechanism. The team distributed an anonymous survey (Appendix B) to collect trainees’ comments on the RAP questionnaire, and specifically which questions were “skipped” and which questions were “difficult to answer.”

Of the 5033 Army trainees invited to complete the RAP questionnaire in October–November 2002, 3189 (63.4%) completed RAP. Of these participants, 1779 (55.8%) completed

the subsequent anonymous survey. Comments from participants included that they found RAP interesting (21.9%), had problems with certain questions (13.5%), found some questions too personal (12.3%), and participated to help other soldiers (9.0%). Only 412 (22.3%) of the 1844 who did not complete the RAP questionnaire completed an anonymous survey. These trainees revealed that they elected not to participate because RAP was too personal (21.7%), they were concerned about confidentiality (20.4%), they were not interested (11.3%), or they did not fully understand the purpose (10.2%). When all 1779 survey respondents were asked which questions were “difficult to answer,” the ACE questions were not cited in the top 10 (Table 3). When asked which questions were “skipped,” 11 trainees cited the ACE question on sexual abuse, making it the 9th most cited in this anonymous survey sample (Table 4). Overall, the Army trainees from this survey found RAP questions on alcohol, smoking, and sex more “difficult” or [likely to be] “skipped” than questions on ACE.

RELIABILITY ANALYSES

Concordance coefficients (Kappa statistics) are estimates of reliability; they quantify the reproducibility of the same variable measured more than once.^{17,18} Kappa values of <0.2 are usually interpreted as showing poor agreement; values between 0.2 and 0.4 indicate fair agreement; values between 0.4 and 0.6 indicate moderate agreement; values between 0.6 to 0.8 indicate good or substantial agreement; and values and between 0.8 and 1.0 indicate excellent agreement. Two kinds of reliability analyses have been performed using RAP questionnaires from Marine recruits in San Diego.

Table 5 illustrates reliability of a questionnaire concept, asked two different ways on the same instrument completed by the same respondent. This is also referred to as “internal reliability.” Note that there are two questions on sexual abuse that may be compared in RAP: “How often did an adult ever touch you sexually or try to make you touch them sexually?” and “Did any of the following events EVER happen to you in your entire life: You were raped (someone forced you to have sex against your will).” These questions are about different, but clearly related, experiences. The Kappa statistic indicates poor internal reliability, but the overall concordance is high. These results are not unexpected, given the difference between the questions and low endorsement rates. In contrast, Kappa statistics show increasing internal reliability for questions about family history of mental illness, family history of alcohol abuse, and personal history of sexual intercourse (Table 5). These results reflect a closer relationship between the content of the two questions compared, as well as higher endorsement rates of the questions.

Table 6 illustrates the more traditional use of Kappa analyses, comparing reproducibility of the same questions from the same respondents on two different occasions. These are also called “test–retest” results. Figure 2 demonstrates that overall Kappa statistics were strong for test–retesting of RAP at both 1 day and 10 weeks apart. Table 6 shows the test–retest results for specific ACE questions among 252 Marine recruits, 10 weeks apart. Kappa values ranged from fair (0.29–0.30) for physical neglect and emotional neglect, to moderately good (0.40–0.52) for sexual abuse, family history of mental illness, physical abuse, emotional abuse, domestic violence, and family history of alcohol problems. Overall test–retesting showed shifting of responses in both directions. There was a small tendency for responses later in recruit training to reflect less history of ACE, but this was inconsistent across all ACE categories. When the time

interval of test–retest of questionnaires was shorter, Kappa values for all RAP questions were much higher. Kappa coefficients tend to be low for questions in which rarer events are assessed. For example, the number of male Marine Corps recruits reporting history of sexual abuse on the RAP questionnaire tends to be low, with a frequency of 1.4%¹⁹ since RAP was implemented in San Diego in 2001.

POTENTIAL FUTURE ANALYSES

RAP data from Army recruits in Fort Jackson, SC, remain to be analyzed for internal reliability. In addition, data from a larger sample of post-RAP anonymous surveys may be available to add to previous analyses.

A new study has been designed to assess test–retest reliability of RAP questionnaire data when completed at Military Entrance Processing Stations (MEPS) compared with initial recruit training. This study may be important for understanding the general reliability of ACE questions and the special circumstances that may affect responses at MEPS and recruit training. The study will be vital if a RAP-like instrument is ever implemented DoD-wide at MEPS.

Finally, and perhaps most importantly, studies are under way to determine the relationship between ACE histories among recruits who completed RAP and subsequent health outcomes of military importance. Of high interest is a complex study under way among Marines to assess whether ACE is a risk factor, or resiliency marker, for development of post-traumatic stress disorder after combat deployment. Full discussion of such ACE analyses is outside the scope of this paper.

CONCLUSIONS

Focus group experiences with ACE questions on the RAP instrument, completed by Marine Corps recruits in San Diego and Army recruits in Fort Jackson, revealed no specific concerns. In extensive post-focus group implementation of RAP (>100,000 questionnaires completed overall), ACE questions also appeared well accepted and completed without problems.

The efforts of the RAP team in Fort Jackson to assess specific RAP concerns in an anonymous survey are noteworthy. ACE questions were not singled out for this evaluation, and were not cited as particularly difficult among the 1779 respondents. Although 11 recruits did report a desire to skip the ACE question on sexual abuse, this number was lower than the number who expressed concerns about other questions, and much lower than the total number of respondents.

Reliability metrics, overall, indicate that ACE questions were likely assessing what they were intended to assess among RAP respondents. Reasonably strong concordance was noted for internal reliability within the instrument. Test–retest results were robust, especially when the instrument was completed with only a short time interval between testing.

It is hoped that results from these, and other analyses, will be helpful to DoD policymakers considering the value of ACE questions in future military questionnaires.

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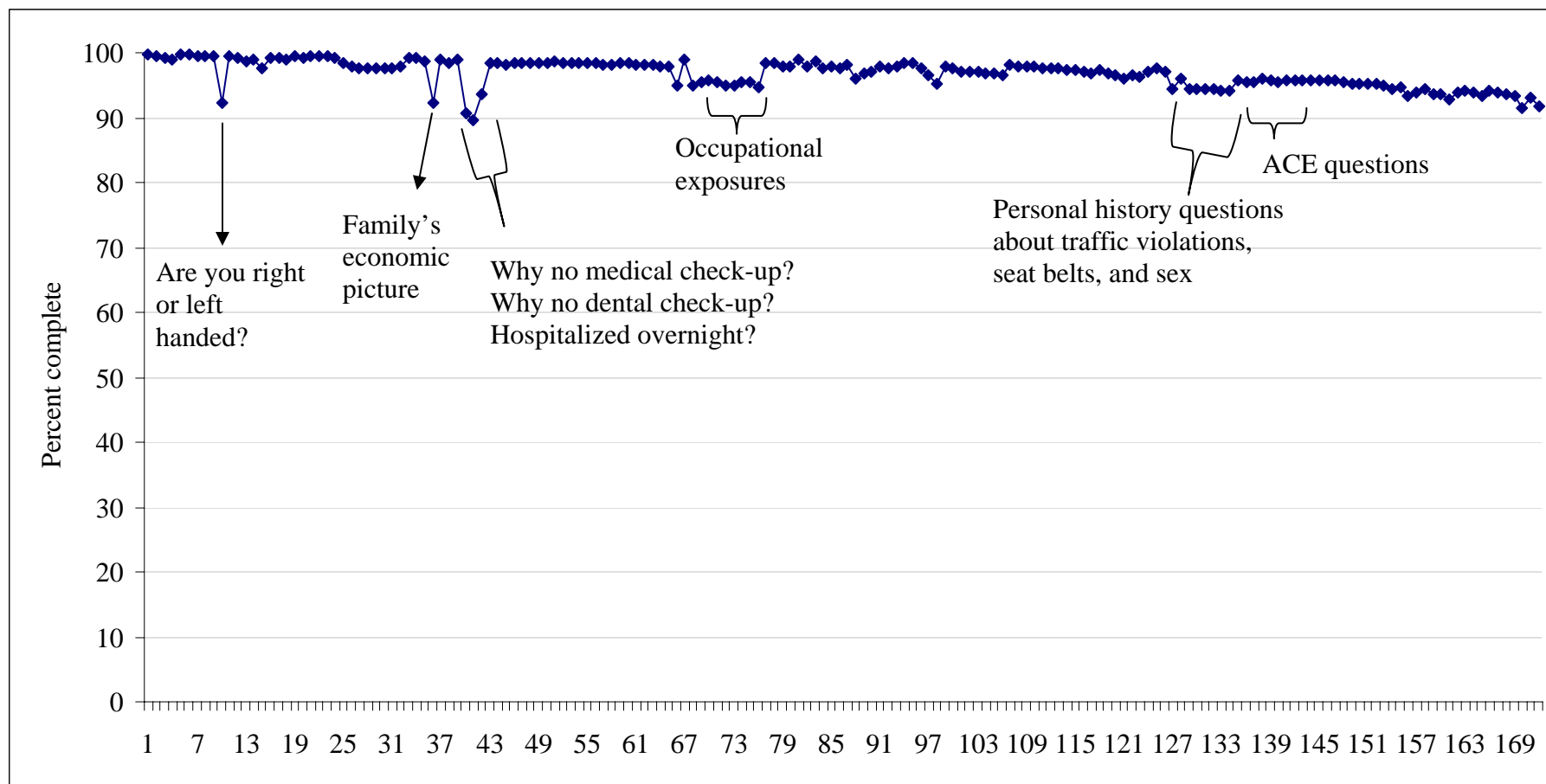


Figure 1. Question-specific completion rates of the RAP questionnaire, June 2002–November 2005, Marine Corps Recruit Depot, San Diego (N=60,008).

Table 1. Percentage Missing for the Top 10 Questions Missed by Respondents (N=60,008) of the RAP Questionnaire at Marine Corps Recruit Depot, San Diego, June 2002–November 2005

No.	Question	% Missing
1	During the year prior to entering the military did you have any of the following problems as a result of your PHYSICAL health? Were limited in any kind of work or other daily activities	8.5
2	During the year prior to entering the military did you have any of the following problems as a result of any EMOTIONAL problems (such as feeling depressed or anxious)? Didn't do work or other activities as carefully as usual	8.4
3	Are you mainly right or left handed?	7.8
4	If you have not had a medical checkup in the past 5 years, other than exams done for military entrance, why not?	7.8
5	How much time did you feel tired or worn out? (during the past year)	7.3
6	If you have not had a dental checkup in the past 5 years, other than exams done for military entrance, why not?	7.0
7	During the year prior to entering the military did you have any of the following problems as a result of any EMOTIONAL problems (such as feeling depressed or anxious)? Accomplished less than you would like	6.8
8	Did you have difficulty doing activities involving concentration and thinking? (during the past year)	6.7
9	During the year prior to entering the military did you have any of the following problems as a result of your PHYSICAL health? Accomplished less than you would like	6.6
10	How much time did you feel downhearted and blue? (during the past year)	6.6

Table 2. Percentage Missing for ACE Questions by Respondents (N=60,008) of the RAP Questionnaire at Marine Corps Recruit Depot, San Diego, June 2002–November 2005

ACE Category	Question	% Missing
Physical neglect	There was someone to take care of you and protect you.	4.4
Emotional neglect	You felt loved	4.6
Emotional abuse	How often did a parent or adult living in your home swear at you, insult you, or put you down?	4.7
Physical abuse	How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at you?	3.9
Domestic violence	How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at each other?	4.1
Sexual abuse	How often did an adult touch you sexually or try to make you touch them sexually?	4.5
Family history of mental illness	Did you live with someone who was depressed or mentally ill?	4.3
Family history of alcohol problems	Did you live with someone who was a problem drinker or alcoholic?	4.4

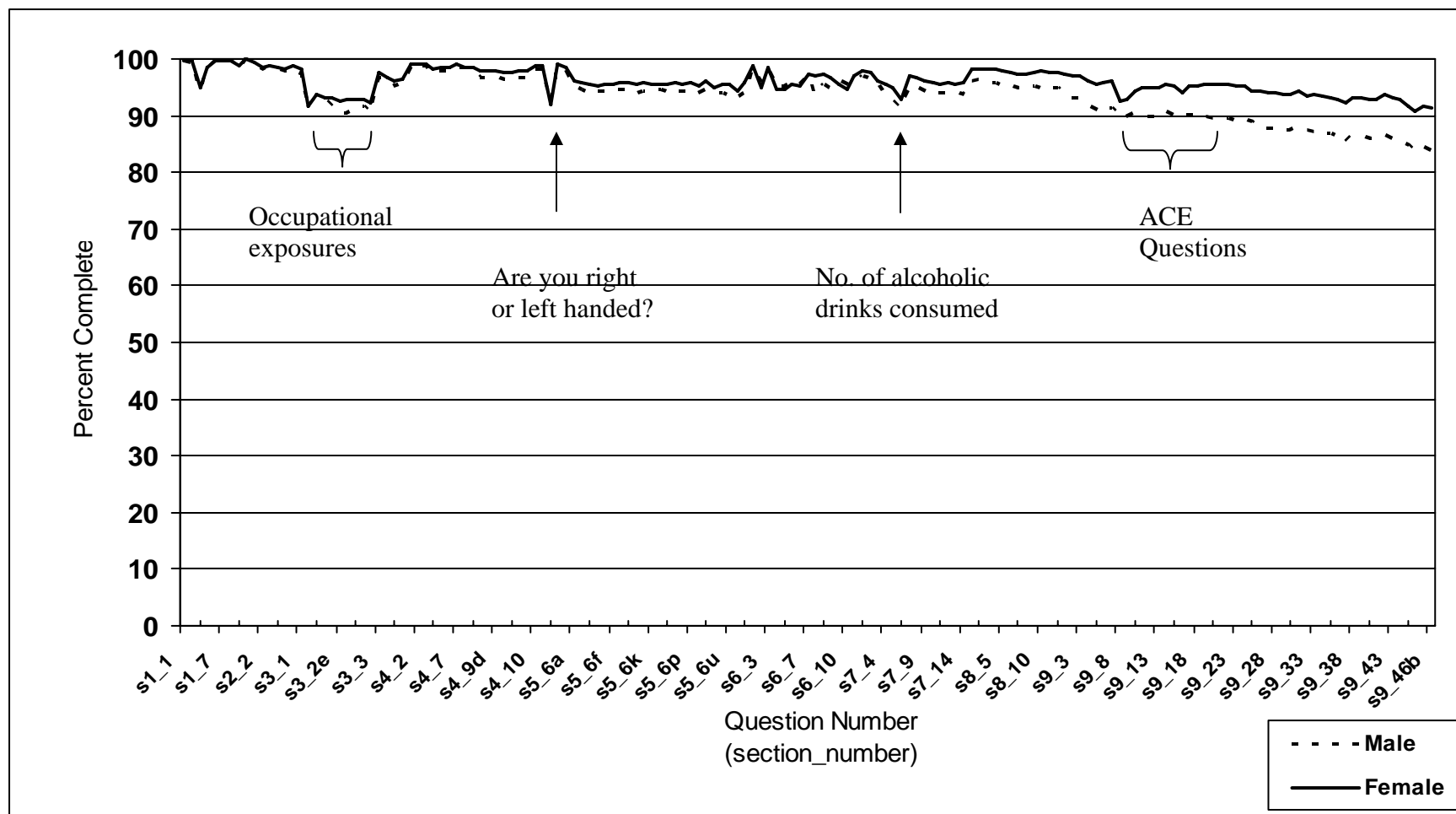


Figure 2. Question-specific completion rates of the RAP questionnaire at Fort Jackson, SC, October 2003 to September 2004 (N=17,959).

Table 3. Top 10 RAP Questions Fort Jackson, SC, Participants Found “Difficult to Answer” and Reasons for Difficulty for October–November 2002 (N=1779)

No.	Question	Number of recruits who reported question was difficult to answer	Examples of reasons why found question difficult
1	How many years have you been drinking alcoholic beverages on a regular basis?	23	I didn't know if I'd be in trouble or not. What does “regular basis” mean? My answer was not one of the choices.
2	During the past year, how many drinks containing alcohol did you have on a typical day of drinking?	14	What is “a typical day of drinking”? It makes it seem like I drink everyday & I don't.
3	Did you or your partner use a condom the last time you had sex?	14	Question is way too personal. Options were not good choices. Felt uncomfortable answering.
4	How old were you when you had sexual intercourse for the first time?	13	Question is way too personal. Felt uncomfortable answering.
5	Have you ever tried to quit smoking cigarettes?	13	“I have never smoked” is not one of the choices.
6	At what age did you first start smoking regularly (meaning, you smoked on most days)?	13	“Never smoked” should be an option.
7	How many years did you smoke more than 3 cigarettes on most days?	12	“Never smoked” should be an option.
8	Have you ever been told by a doctor or nurse that you had a sexually transmitted disease or STD (like chlamydia, gonorrhea, genital herpes, or syphilis)?	12	Very personal question. Concerned about confidentiality.
9	Is the father who raised you alive?	12	Typographical error in answer choices (said “she” instead of “he”). Note: This was corrected.
10	During the year prior to entering the military, did you have any of the following problems as a result of any emotional problems (such as feeling depressed or anxious)? a. accomplished less than you would like b. didn't do work or other activities as carefully as usual	12	Wording is confusing. I did not understand the choices for the question.

Source: Chervak MC, Hauret K, Koth K, Darakjy S, Kenyon M, Canada S, Jones B. The value of understanding your survey population: lessons from the Recruit Assessment Program at Ft Jackson. Poster presented at 6th Annual Army Force Health Protection Conference, August 11–17, 2003, Albuquerque, New Mexico.

Table 4. Top 10 RAP Questions Fort Jackson, SC, Participants “Skipped or Chose Not to Answer” and Reasons for Skipping for October–November 2002 (N=1779)

	Question	Number of recruits who skipped or chose not to answer question	Examples of reasons why skipped or chose not to answer question
1	How old were you when you had sexual intercourse for the first time?	34	Felt that it was an inappropriate question; uncomfortable answering.
2	Did you or your partner use a condom the last time you had sex?	29	Question was too personal. Do not wish to disclose.
3	Have you ever been told by a doctor or nurse that you had a sexually transmitted disease or STD (like chlamydia, gonorrhea, genital herpes, or syphilis?)	18	Did not feel comfortable answering question. Too personal.
4	During the past year, how many drinks containing alcohol did you have on a typical day of drinking?	17	My answer was not one of the choices. I do not typically drink every day. Do not wish to disclose.
5	How many years have you been drinking alcoholic beverages on a regular basis?	16	My answer was not there (occasionally). What is considered “regular”?
6	At what age did you first start smoking regularly (meaning, you smoked on most days)?	14	“Don’t smoke” is not an answer option. I did not feel like giving that information.
7	How many years did you smoke more than 3 cigarettes on most days?	12	“Don’t smoke” or “not applicable” is not an answer option.
8	When you were smoking regularly, how many packs did you smoke each day?	11	“Don’t smoke” or “not applicable” is not an answer option.
9	How often did an adult ever touch you sexually or try to make you touch them sexually?	11	Too personal. None of your business. Didn’t feel comfortable answering. I’m not certain how this is relevant to providing health care.
10	Have you ever tried to quit smoking cigarettes?	10	“Don’t smoke” or “not applicable” is not an answer option.

Source: Chervak MC, Hauret K, Koth K, Darakjy S, Kenyon M, Canada S, Jones B. The value of understanding your survey population: lessons from the Recruit Assessment Program at Ft Jackson. Poster presented at 6th Annual Army Force Health Protection Conference, August 11–17, 2003, Albuquerque, New Mexico.

Table 5. Internal Reliability of ACE Questions on the RAP Questionnaire from Marine Corps Recruit Depot, San Diego: Comparing Two Different Questions from the Same Respondent and Questionnaire

Category	Question 1		Question 2		N	Kappa (95% CI)	% Concordance [†]
	Question	Responses	Question	Responses			
Sexual abuse	How often did an adult ever touch you sexually or try to make you touch them sexually?	Never, Once/twice, Sometimes, Often, Very often [*]	You were raped (someone forced you to have sex against your will).	Yes, No [*]	56,560	0.12 (0.10–0.15)	98.1
Family history of mental illness	Did you live with someone who was depressed or mentally ill?	Yes, No [*]	Has your biological mother or father ever had mental or emotional problems?	Yes, No, Do not know [*]	49,463	0.43 (0.42–0.45)	94.1
Family history of alcohol problems	Did you live with someone who was a problem drinker or alcoholic?	Yes, No [*]	Has your biological mother or father ever had alcohol problems?	Yes, No, Do not know [*]	50,371	0.56 (0.55–0.58)	91.6
History of sexual intercourse	How old were you when you first had sexual intercourse for the first time?	I have never had sex, I have had sex [‡]	Did you or your partner use a condom the last time you had sex?	I have not had sex, I have had sex [‡]	72,815	0.94 (0.94–0.94)	98.2

* Responses were dichotomized into yes/no. Those with missing and “do not know” responses were removed from the analysis.

The sexual abuse responses were dichotomized into No (Never raped) and Yes (all other responses).

† Concordance is calculated as the number of responses that are identical, divided by the total number of respondents.

‡ [All other responses]

CI = confidence interval.

Kappa Interpretation

0.0–0.2 poor agreement

0.2–0.4 fair agreement

0.4–0.6 moderate agreement

0.6–0.8 good/substantial agreement

0.8–1.0 excellent/greater than substantial agreement

Table 6. Reliability of ACE Questions on the RAP Questionnaire from Marine Corps Recruit Depot, San Diego: Test–Retest Results Comparing the Same Question from the Same Respondent from 2 Separate Questionnaires, Taken 10 Weeks Apart

ACE Category	Question from RAP questionnaire	N	Kappa (95% CI)	% Concordance
Physical neglect*	There was someone to take care of you and protect you.	248	0.29 (0.19–0.39)	62.1
Emotional neglect*	You felt loved	244	0.30 (0.20–0.40)	66.0
Emotional abuse*	How often did a parent or adult living in your home swear at you, insult you, or put you down?	246	0.45 (0.36–0.53)	52.0
Physical abuse*	How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at you?	247	0.43 (0.34–0.53)	65.2
Domestic violence*	How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at each other?	249	0.48 (0.35–0.61)	78.3
Sexual abuse	How often did an adult touch you sexually or try to make you touch them sexually?	248	0.40 (0.00–0.94)	98.8
Family history of mental illness	Did you live with someone who was depressed or mentally ill?	248	0.41 (0.17–0.66)	94.0
Family history of alcohol problems	Did you live with someone who was a problem drinker or alcoholic?	247	0.52 (0.36–0.68)	89.5

* These questions are based on a Likert scale from Never to Very Often (with 5 categories) and therefore weighted Kappa statistics were calculated instead of simple Kappa statistics.

† Concordance is calculated by adding up those responses that are the same and dividing by the total number of respondents.

CI = confidence interval.

Kappa Interpretation

0.0–0.2 poor agreement

0.2–0.4 fair agreement

0.4–0.6 moderate agreement

0.6–0.8 good/substantial agreement

0.8–1.0 excellent/greater than substantial agreement

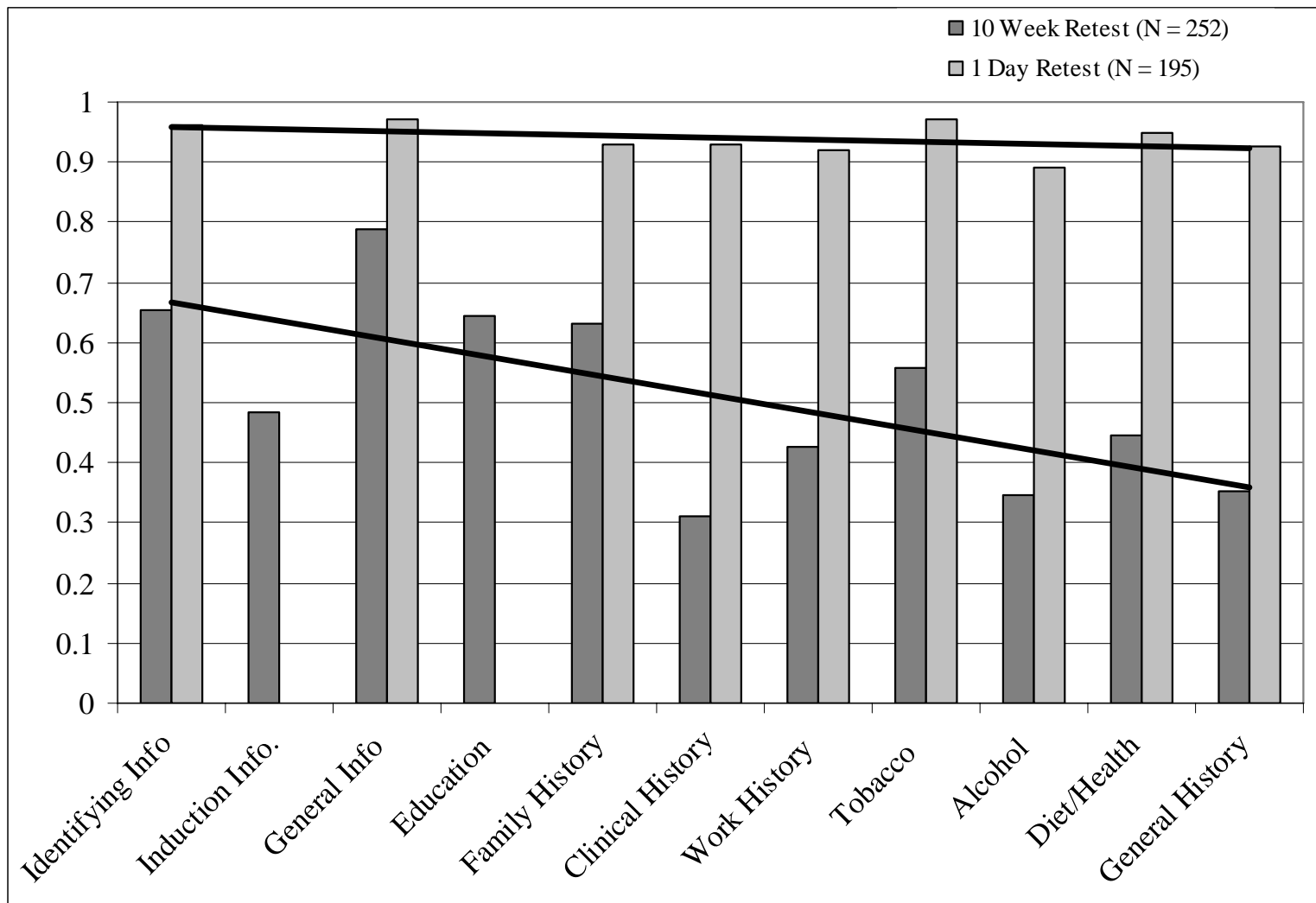


Figure 3. Section-by-section RAP questionnaire reproducibility from Marine Corps Recruit Depot, San Diego, when test–retest spaced 1 day apart, with excellent overall Kappa of 0.92, compared with test–retest spaced 10 weeks apart, with moderate overall Kappa of 0.45.

Appendix A. **CURRENT RAP QUESTIONNAIRE USED AT MARINE CORPS RECRUIT
DEPOT, SAN DIEGO**

See attached Document.

Appendix B. **FORT JACKSON SURVEY EVALUATION FORM**
See attached Document.